Global Hawk #871 11/05/12 - 11/06/12

Aircraft:
Global Hawk #871 (See full schedule)
Flight Number:
871-0083
Payload Configuration:
HS3 - TN871 2012 config
Nav Data Collected:
No
Total Flight Time:
24.2 hours
Submitted by:
Chris Naftel on 11/08/12
Flight Segments:

From:	EAFB	**To:**	EAFB
Start:	11/05/12 21:36 Z	**Finish:**	11/06/12 21:50 Z
Flight Time:	24.2 hours		
Log Number:	13H008 - Completed as of this flight.	**PI:**	Marilyn Vasques
Funding Source:	Hal Maring - NASA - SMD - ESD Radiation Science Program		
Purpose of Flight:	Science		
Comments:	During this first flight of TN871 in support of a science mission, the aircraft overflew 4 buoys in the Pacific Ocean and overflew a low pressure system between Hawaii and Alaska. The aircraft operated nominally, except for a Ku Satcom failure near the end of the flight.		

Flight Hour Summary:

	12H002	13H008
Flight Hours Approved in SOFRS	327	
Flight Hours Previously Approved		178.1
Total Used	148.9	46
Total Remaining		132.1

13H008 Flight Reports

Date	Flt #	Purpose of Flight	Duration	Running Total	Hours Remaining
10/06/12	872-0102	Science	7.3	7.3	170.8
10/12/12	872-0103	Ferry	9.7	17	161.1
11/01/12	871-0082	Check	4.8	21.8	156.3
11/05/12 - 11/06/12	871-0083	Science	24.2	46	132.1

Source URL: https://airbornescience.nasa.gov/flight_reports/Global_Hawk_871_11_05_12_-_11_06_12

Related Science Report:

HS3 - Global Hawk #871 11/05/12 - 11/06/12 Science Report

Mission:
HS3
Mission Summary:

Hurricane and Severe Storm Sentinel (HS3) Mission

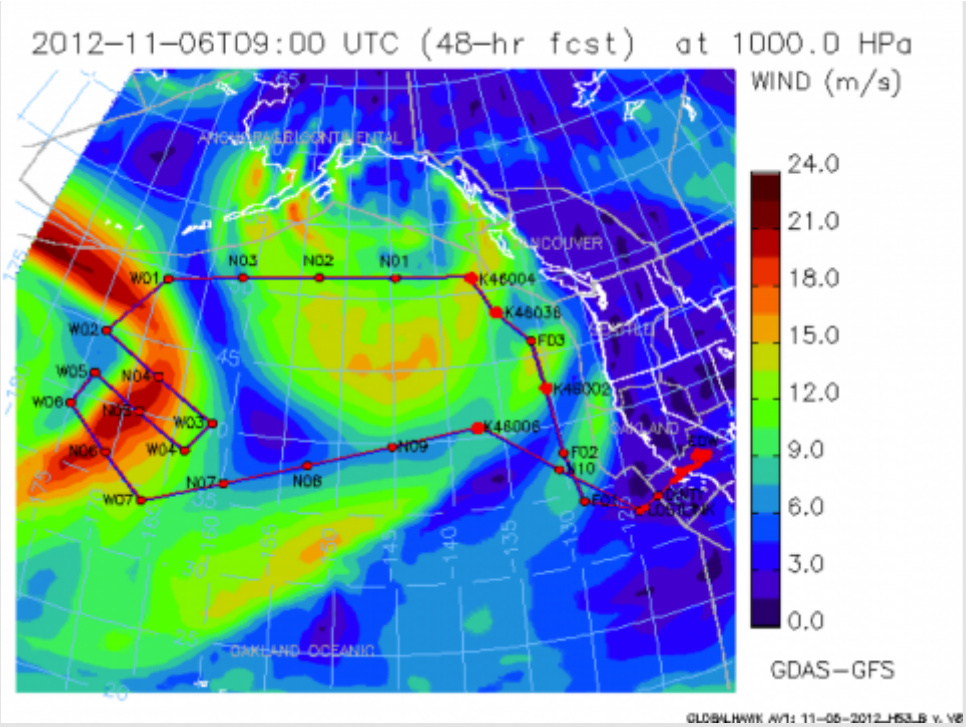
2012-11-05 Flight Report

This was the 1st ***science*** flight of AV-1 for HS3.

The objective of this flight was to test the science operation of the AV-1 instrument payload (HIRAD, HIWRAP, and HAMSR). The flight includes overflights of 4 buoys that measure surface winds. These overflights provide wind information for HIRAD and HIWRAP validation. As part of the overflight, we have designed a series of 3 passes over each buoy that resembles a rotated figure 4 pattern. With a 1200 PST takeoff (2000 UT), the plane first parallels the US W coast on a northerly track. Three buoys are passed over (K48002, K46036, and K46004). The plane then turns west to drive a 4-leg lawnmower pattern over a storm system that is in the central Pacific. On the return, we pass over buoy K46006.

Due to Ku problems that delayed takeoff and fuel concerns, the pattern was shortened to remain in the original flight window. The southern-most east-west leg of the lawnmower was removed and now the aircraft will fly direct from W06 to buoy K46006.

Due to fuel concerns, the lawnmower pattern was cut short on the eastern side. Although sampling is limited to the western side of the original lawnmower, this region is the most likely for precipitation as IR has indicated continuous cloud development to the south of the pattern.

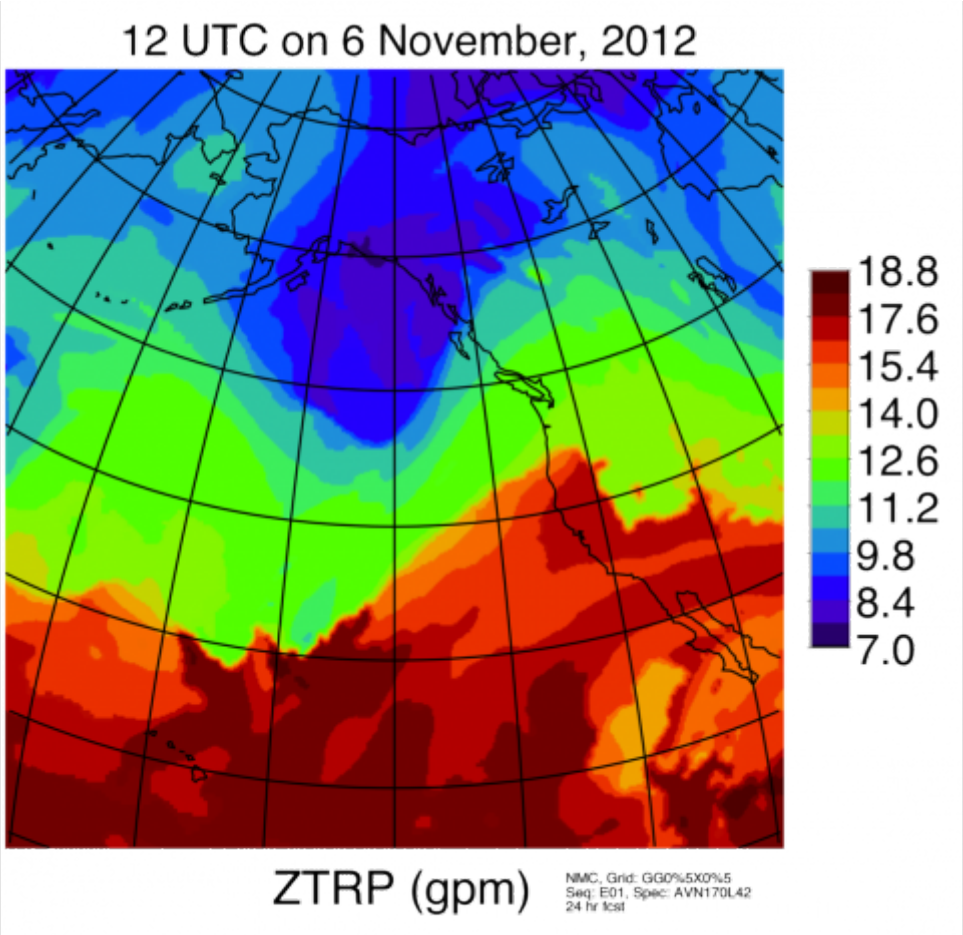


Scientist	Start (PST/EST)	End	Duration	Segment
Newman	1130/1430	1600/1900	4.5	Take off to first buoy
Heymsfield/Braun	1530/1830	1830/2130	3	First 3 buoys
Black/Doyle	1800/2100	2200/0100	4	Transit to Lawnmover
Zawislak	2130/0030	0430/0730	7	Lawnmower pattern
Guimond	0400/0700	0900/1200	5.5	Transit to final buoy
Braun	0830/1130	1330/1630	5	Final Buoy to landing

1846 PST Engine start

1957 Ku problems delaying takeoff

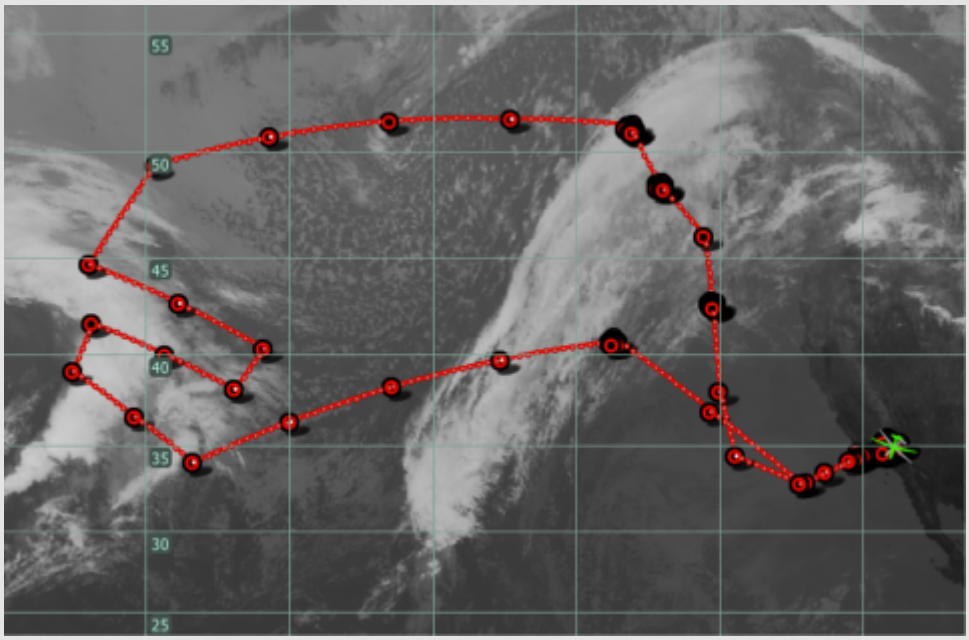
Some worries about cloud heights. Current forecast is that cloud tops will be below 12 km (40 kft).



2004 HIWRAP and HIRAD turned off because of heat problems while the Ku system is trouble-shot.

2025 KU still not operational.

2037 Ku still not operational. The storm system is readily apparent on the GOES IR channel on the western side of the image. As the system drifts eastward, our legs should be in approximately the right spot.



2104 Ku finally came up, and we?re now proceeding to turn HIRAD back on.

2127 Ready to taxi.

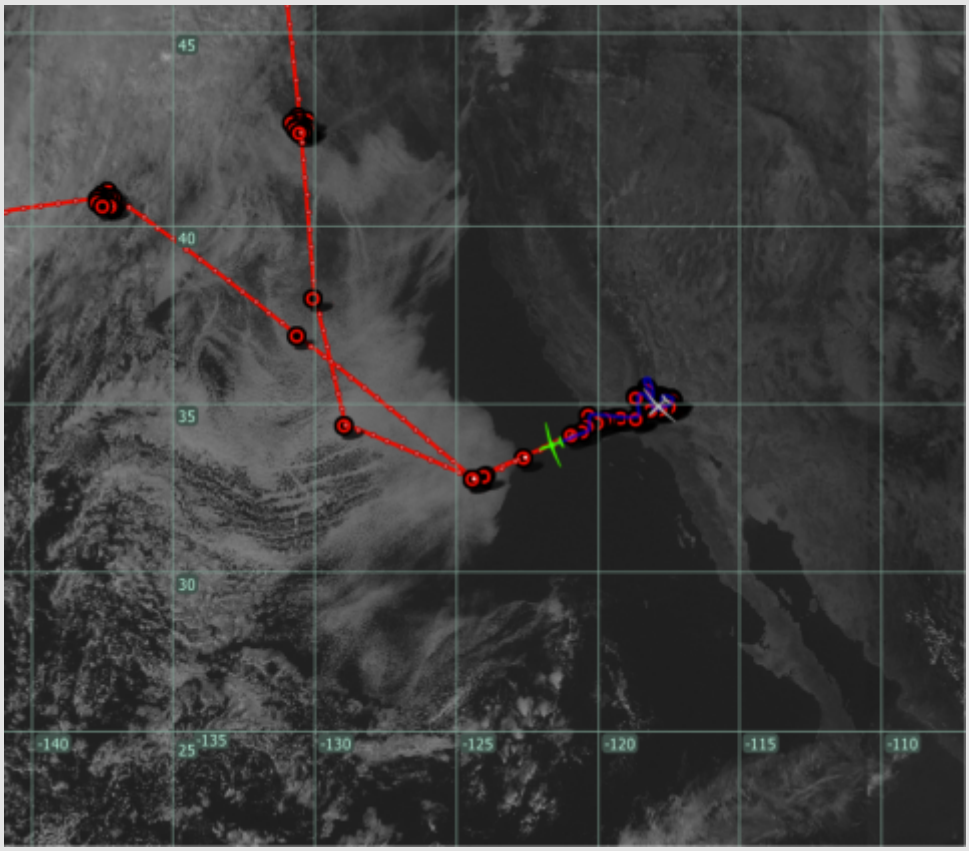
2136 Takeoff.

2230 Idling for an hour on the ramp while Ku struggled to get up is forcing us to cut 1.5 hours off of the flight. Initial discussion suggests that we could delete the northern-most buoy (K46004) and shorten some of the legs. We?re planning an 8PM EST telecon using web-ex to work out a new plan.

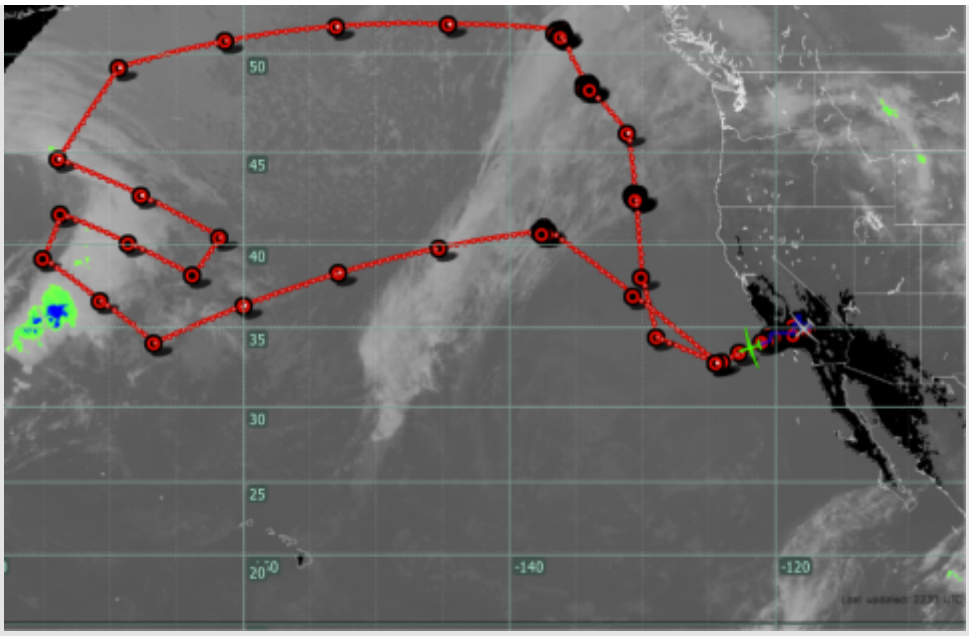
2253 Feet wet over the Pacific.

2305 I checked the buoy web page (http://www.ndbc.noaa.gov) and found that the ?extra? buoys we were planning to overfly are still inoperable. Hence, I asked the pilots to skip the way-points from LOSTLINK to K46002, and then direct to K46036. Should shave some time off of the flight.

2309 Initial pass over the Pacific was quite clear.



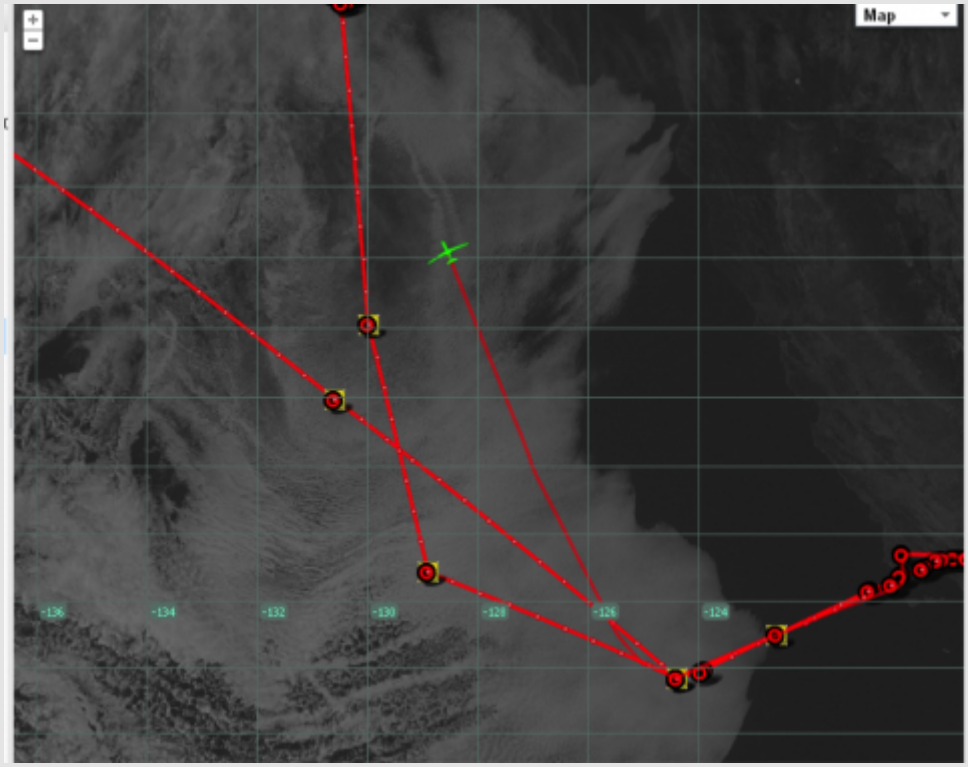
2312 The IR image looks very clear also. Note the cold tops near the dateline. These are actually well below the plane (mid-lat T profile).



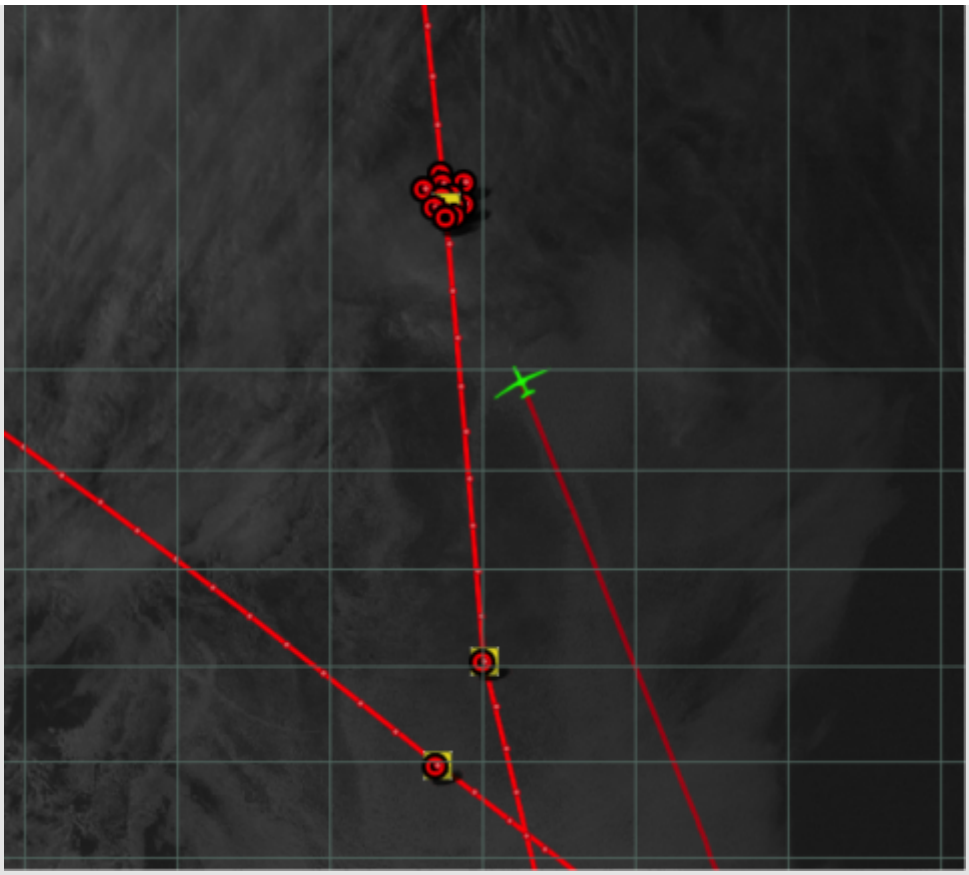
2322 Starting to overfly the low levels clouds seen above in the GOES visible image.

2349 GH is skipping waypoints F01 and F02 and flying direct to K46002

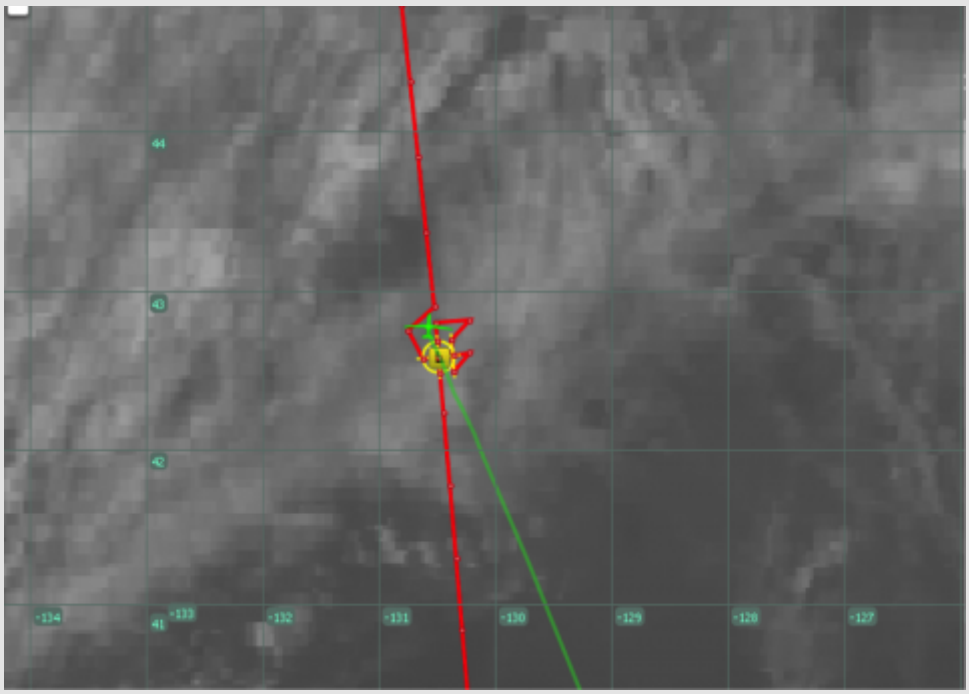
0052 Had trouble with GHOC console computer so back on line now. GOES vis image at 0057:



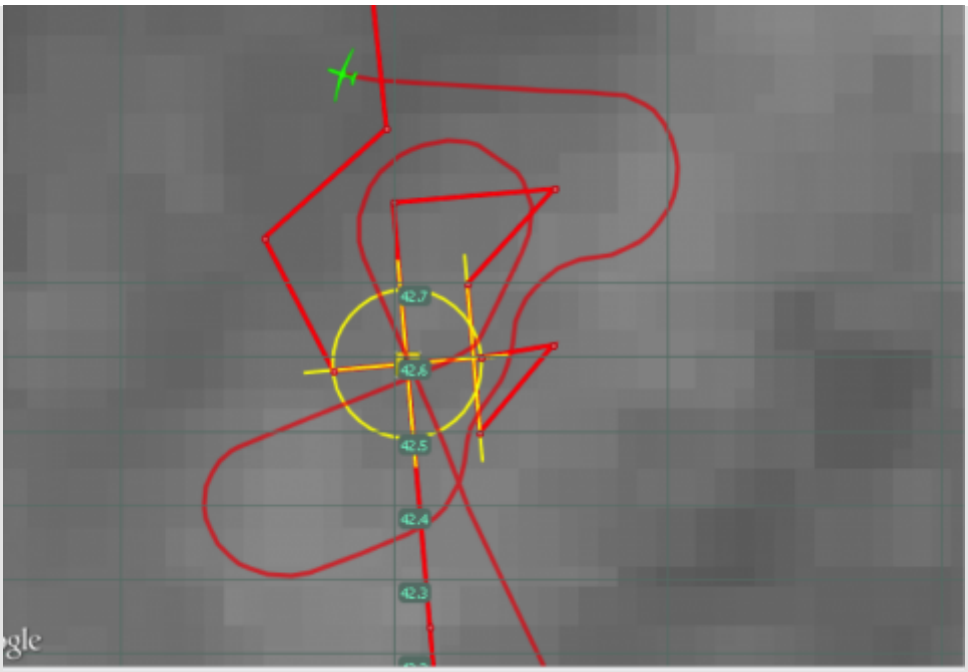
0100 Heading toward buoy K46002. Working on new flight plan. Strong 40 kt headwind for GH on westbound leg. Tailwind on eastbound leg on return to base.



0121 GOES vis. Approaching buoy K46002. Start buoy maneuver at approx 0138. Crossing buoy at 0140.



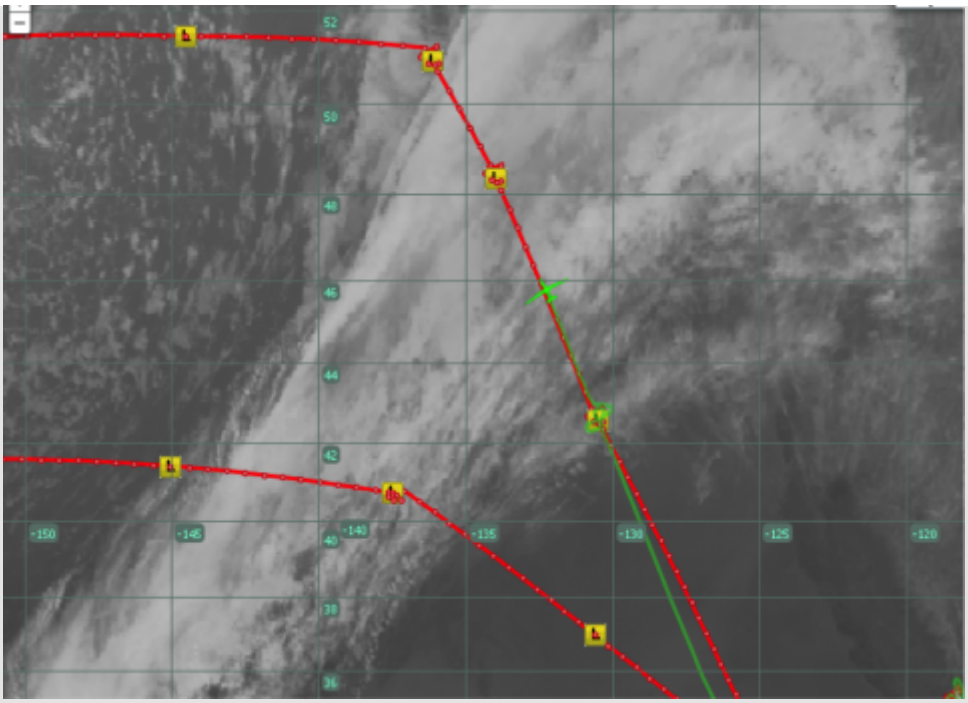
0143 IR image. Having trouble on this maneuver due to the drift of the plane. Then the link mod went down so they are salvaging the pass. Too much drift so they will skip the 3rd pass over the buoy.



Winds at K46002 up to overpass time.

#YY	MM	DD	hh	mm	WDIR	WSPD	GDR	GST	GTIME
#yr	mo	dy	hr	mn	degT	m/s	degT	m/s	hhmm
2012	11	06	01	50	142	2.6	140	5.0	0131
2012	11	06	01	40	148	3.1	999	99.0	9999
2012	11	06	01	30	150	3.1	999	99.0	9999
2012	11	06	01	20	129	2.8	999	99.0	9999
2012	11	06	01	10	113	2.7	999	99.0	9999
2012	11	06	01	00	141	2.6	999	99.0	9999
2012	11	06	00	50	122	2.8	150	5.0	0021
2012	11	06	00	40	116	2.6	999	99.0	9999
2012	11	06	00	30	140	2.5	999	99.0	9999
2012	11	06	00	20	143	2.6	999	99.0	9999

0211: Continuing on after buoy maneuver to buoy K46036



0243: IR image showing cloud band. This is showing up in HIWRAP as stratocu.
At 0250, HIWRAP is seeing some heavier precip. Stratiform after 0300. Probably stratiform over K46036.

0311: Approaching buoy K46036 and start of buoy maneuver.

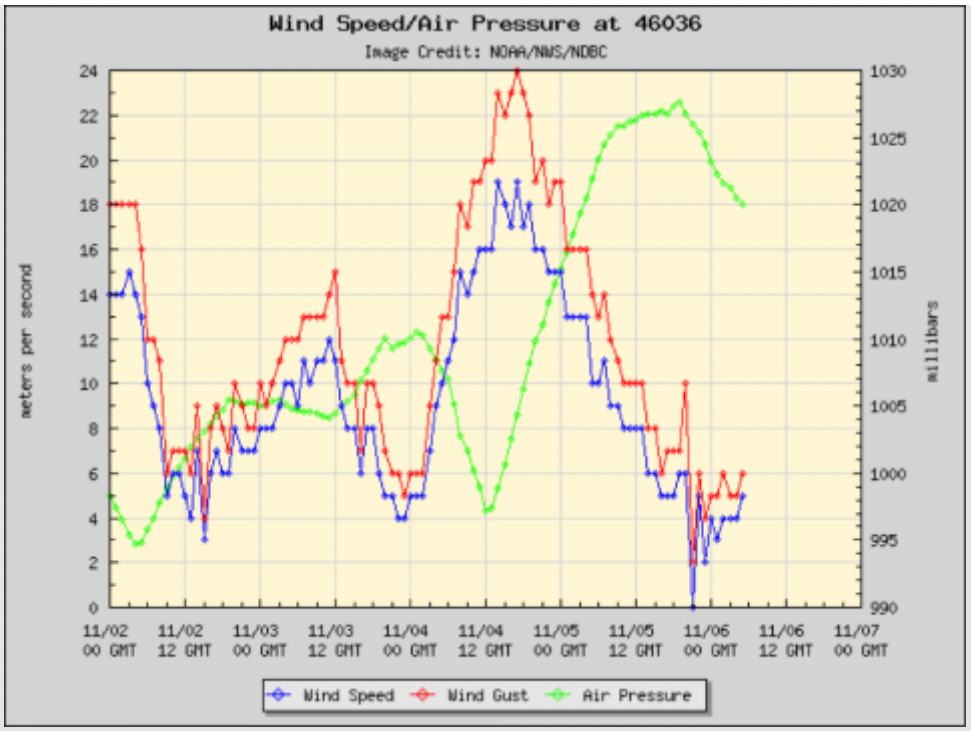
K46036 Buoy Data

MM	DD	TIME (GMT)	WDIR	WSPD m/s	GST m/s	WVHT m	DPD sec	APD sec	MWD	PRES mb	PTDY mb	ATMP °C	WTMP °C	DEWP °C	SAL psu	VIS km	TIDE m
11	06	0400	S	4.0	5.0	3.5	12	-	-	1020.5	-1.8	12.8	11.6	-	-	-	-
11	06	0300	S	4.0	5.0	3.7	12	-	-	1021.3	-1.9	13.0	11.7	-	-	-	-
11	06	0200	SE	4.0	6.0	3.7	14	-	-	1021.6	-2.9	13.4	11.7	-	-	-	-
11	06	0100	SE	3.0	5.0	3.8	12	-	-	1022.3	-3.1	12.9	11.6	-	-	-	-
11	06	0000	SE	4.0	5.0	4.0	12	-	-	1023.2	-2.8	13.2	11.7	-	-	-	-
11	05	2300	S	2.0	4.0	3.8	14	-	-	1024.5	-2.3	13.1	11.7	-	-	-	-

Light winds at both previous buoys.

0334: GH heading to next buoy.

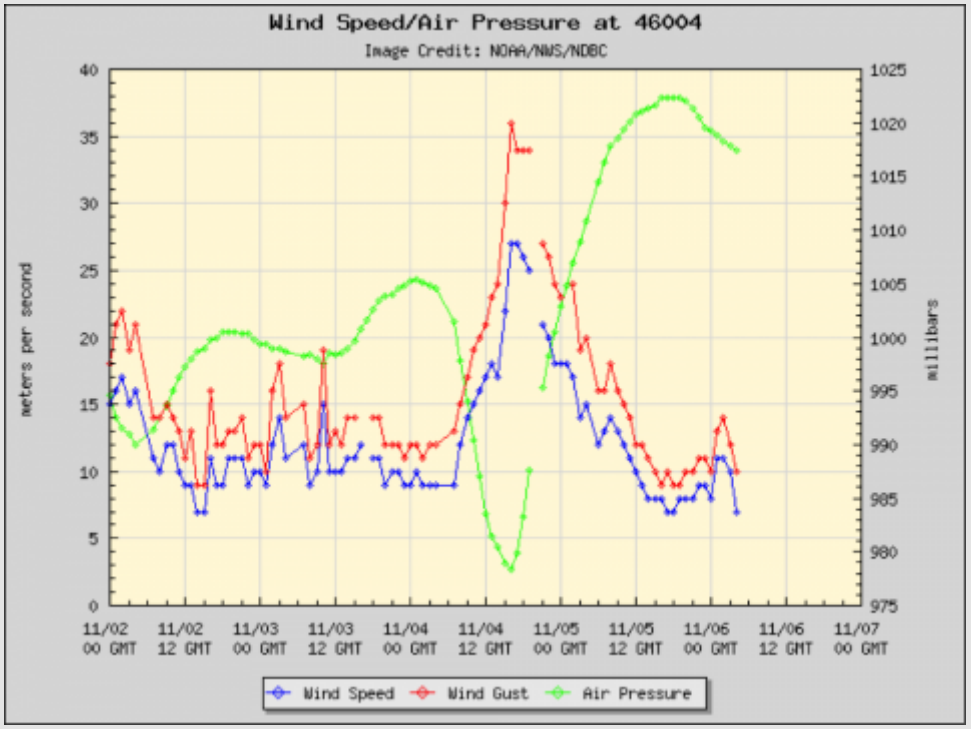
0344: Finished bow tie pattern over buoy 46036- back on track for buoy 46004



0405: cleared frontal cloud band

0408: start bow tie over buoy 46004

0425: finish bow tie over buoy, head for storm

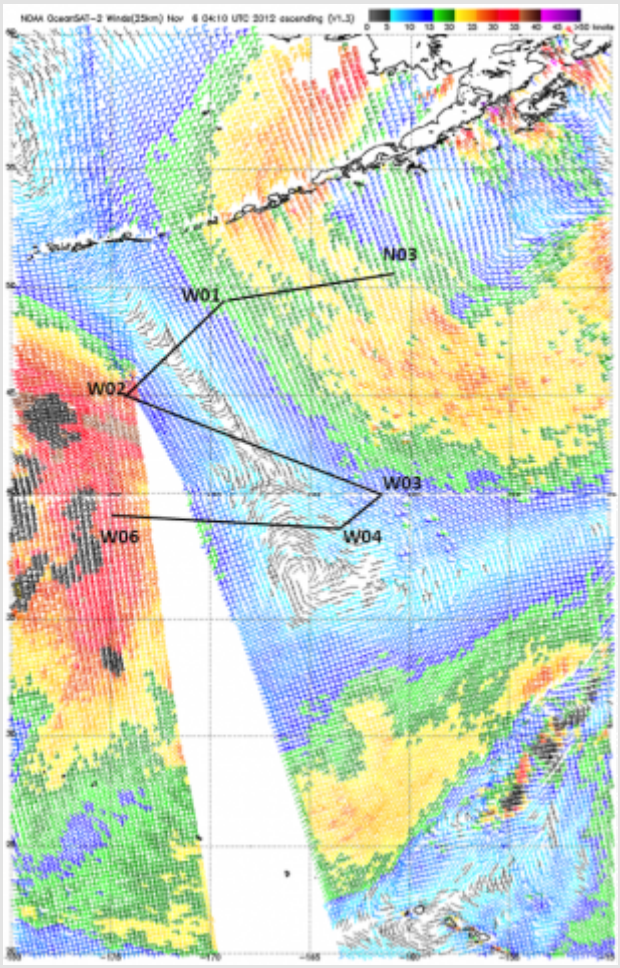


MM	DD	TIME (GMT)	WDIR	WSPD m/s	GST m/s	WVHT m	DPD sec	APD sec	MWD	PRES mb	PTDY mb	ATMP °C	WTMP °C	DEWP °C	SAL psu	VIS km	TIDE m
11	06	0300	SSW	10.0	12.0	-	-	-	-	1017.9	-1.4	-	-	-	-	-	-
11	06	0200	SSW	11.0	14.0	3.9	11	-	-	1018.3	-1.3	9.6	9.3	-	-	-	-
11	06	0100	S	11.0	13.0	4.0	12	-	-	1018.8	-1.7	9.4	9.3	-	-	-	-

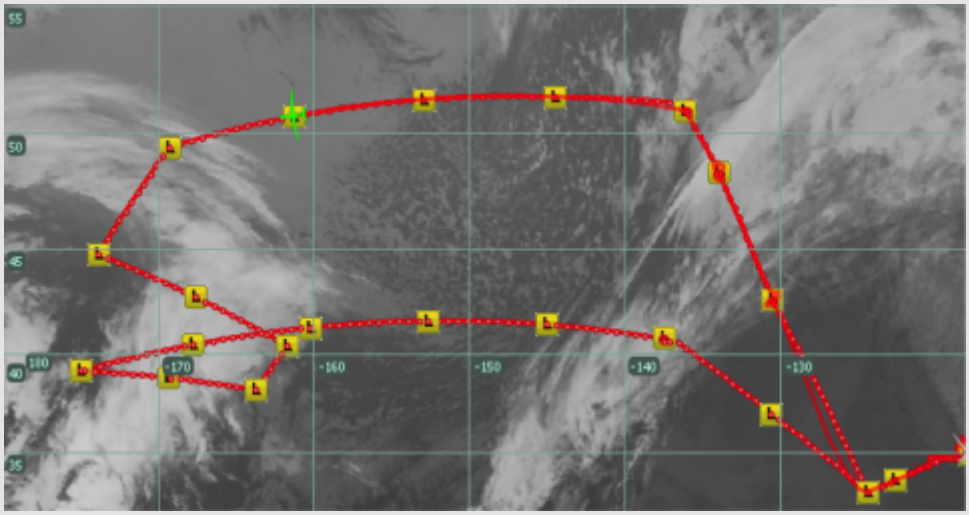
11	06	0000	S	8.0	10.0	-	-	-	-	1019.3	-2.1	-	-	-	-	-	-
11	05	2300	SSW	9.0	11.0	-	-	-	-	1019.6	-2.4	-	-	-	-	-	-

0522: over cold air west of LOW#1 Benard cellular convection below

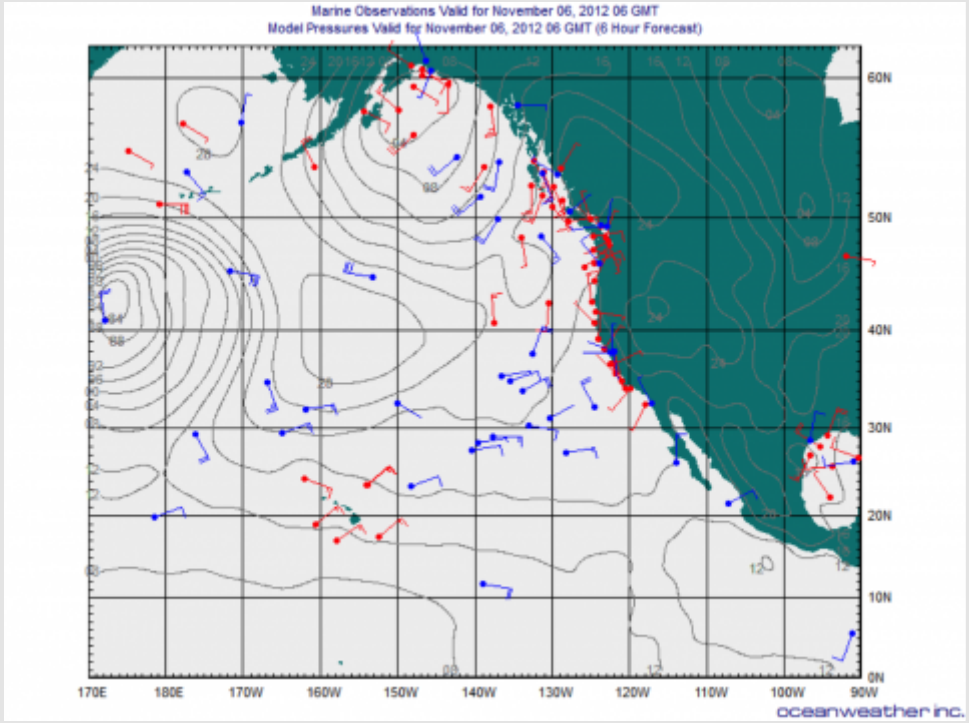
0600: Jon Z. takes over. Currently on transit west from Buoy K46004 to W01. IR imagery indicates only low level stratus for much of the leg, finally reaching mid to high cloud at W01 ? entering the lawnmower pattern from the north. The OSCAT overpasses from 11/05 (below) indicate a region of 15-25 kt winds between N03 and W01 (no high cloud or precipitation along this leg). The highest winds associated with the system are most likely on the western side of the pattern.



0710: The image above indicates higher winds just west of the pattern from earlier OSCAT imagery (from 11/05 ascending). Given the amount of time between the OSCAT observations above and the pattern time, the high winds should now be in a good position for the lawnmower. The pattern should consist of regions of light to moderate precipitation (mostly near the southern east-west leg, according to SSM/IS derived rain rate), and winds as high 30-35 (40?) kt. IR imagery indicates that the frontal cloud band is located right in the center of the pattern ? although much of the precipitation is likely on the western and southern side of the cloud band. Given all the information, no adjustment of the pattern is expected.

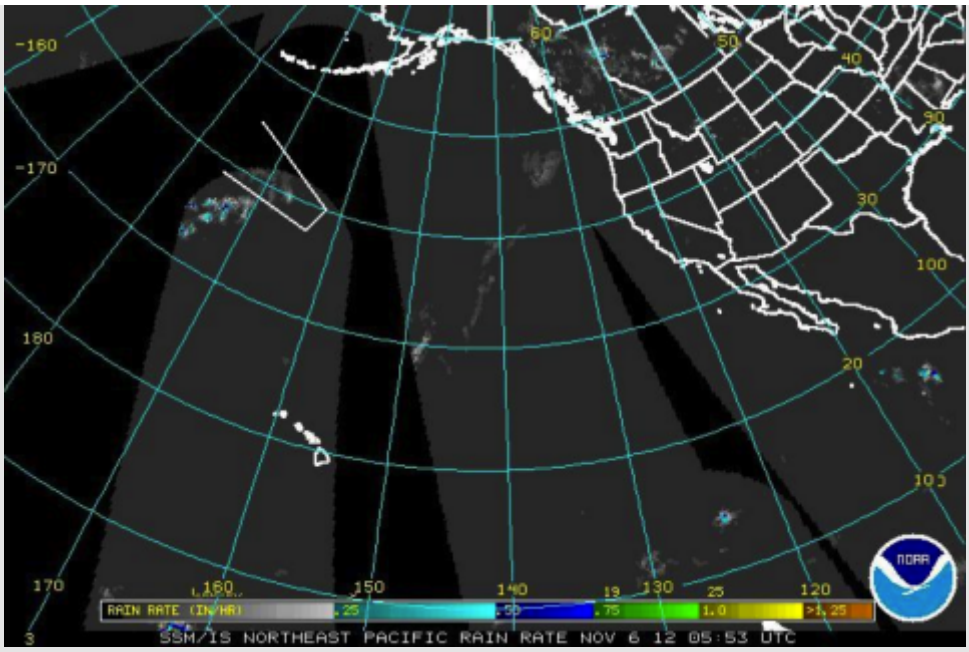


0722 UTC image showing IR, track and aircraft approaching N03.



Buoy and ship? observations valid at 0600Z with the 6-hour forecast (also valid 0600Z) surface pressure. 30 kt easterly wind located on eastern side of low near 172W/45N is near W02.

0751Z: HIWRAP will begin to collect data just past halfway between N03 and W01. OSCAT indicates winds possibly exceeding 20 kt. IR indicates mostly low cloud and entering a cirrus band northeast of the low.

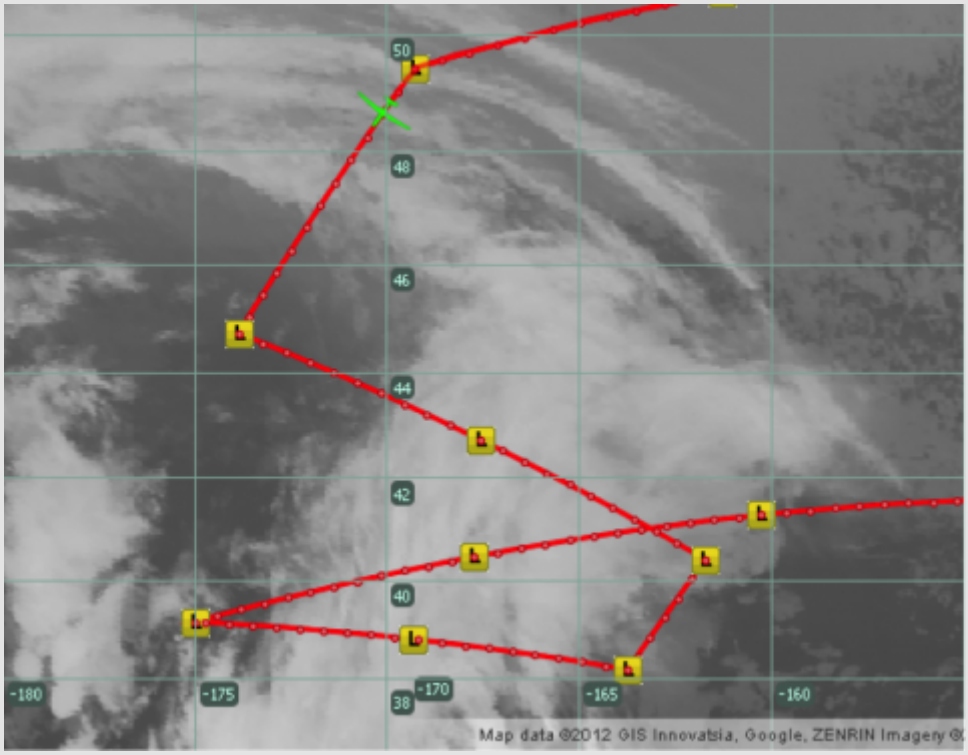


SSM/IS rain rate at 0553 UTC indicating light precipitation in the pattern, with more moderate precipitation developing on the southern portion of the pattern.

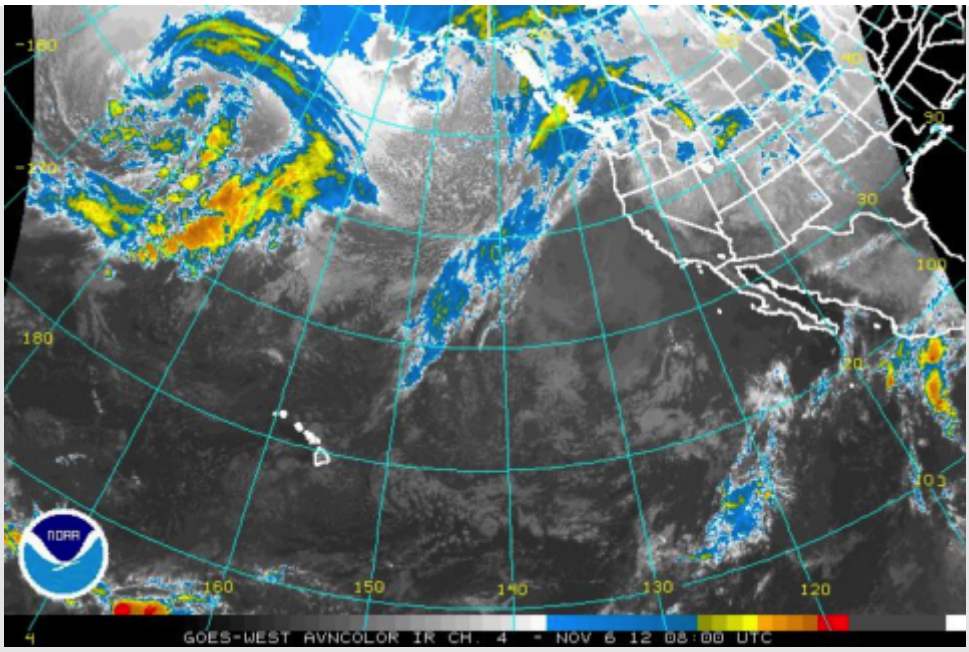
0811: IR loops indicate that the more moderate precipitation to the south may be moving up north towards the pattern. An eastward shift of the pattern (or at least W06) may result in missing some of the better precipitation rates and high winds on the southwestern portion of the pattern.

0820: Passed W01. Expected time according to table V9 was 0743Z.

0825: IR loop indicates new clouds developing along western side of frontal cloud band, along 170 and 180W and between 35 and 40N; north-south oriented.

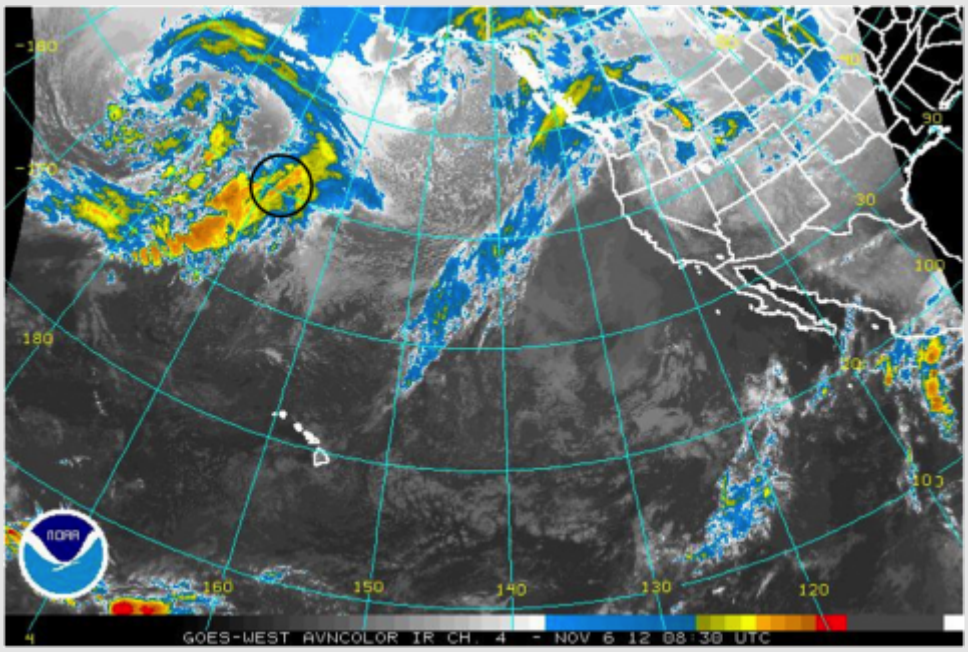


0722 UTC image showing IR, track and aircraft after W01 (IR time unknown).

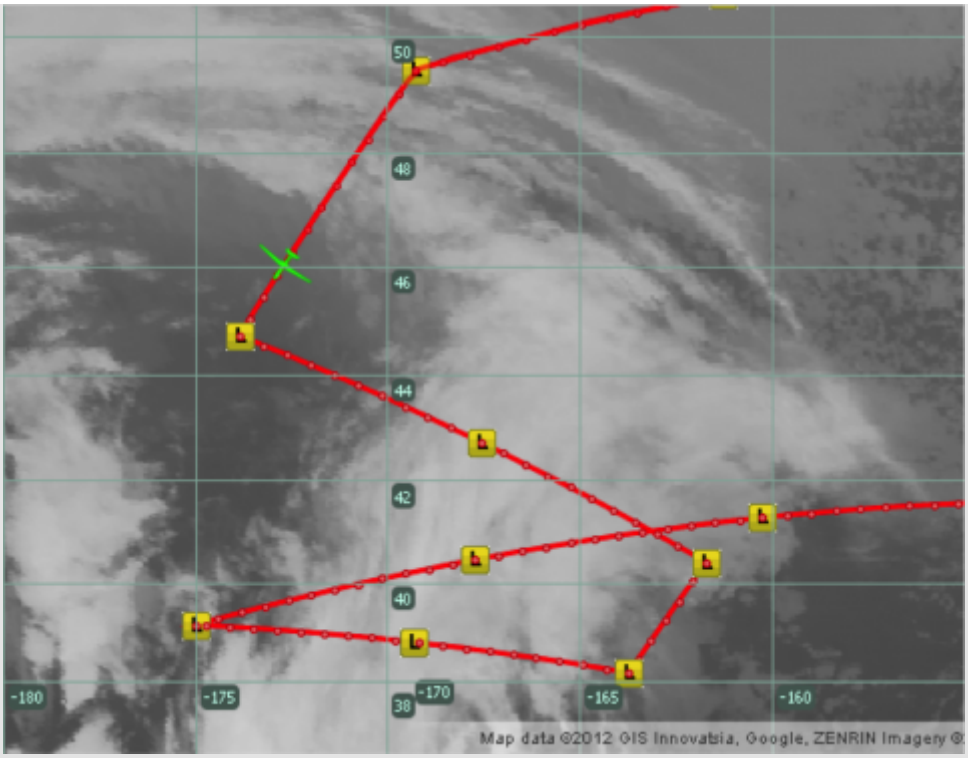


GOES IR from 0800 UTC

0900: IR (see 0830Z image below) indicates a line of colder cloud tops has developed along 168-169W from 38 to 42N ? right in the middle of our lawnmower. Of course, unknown as to what this may mean for precipitation.



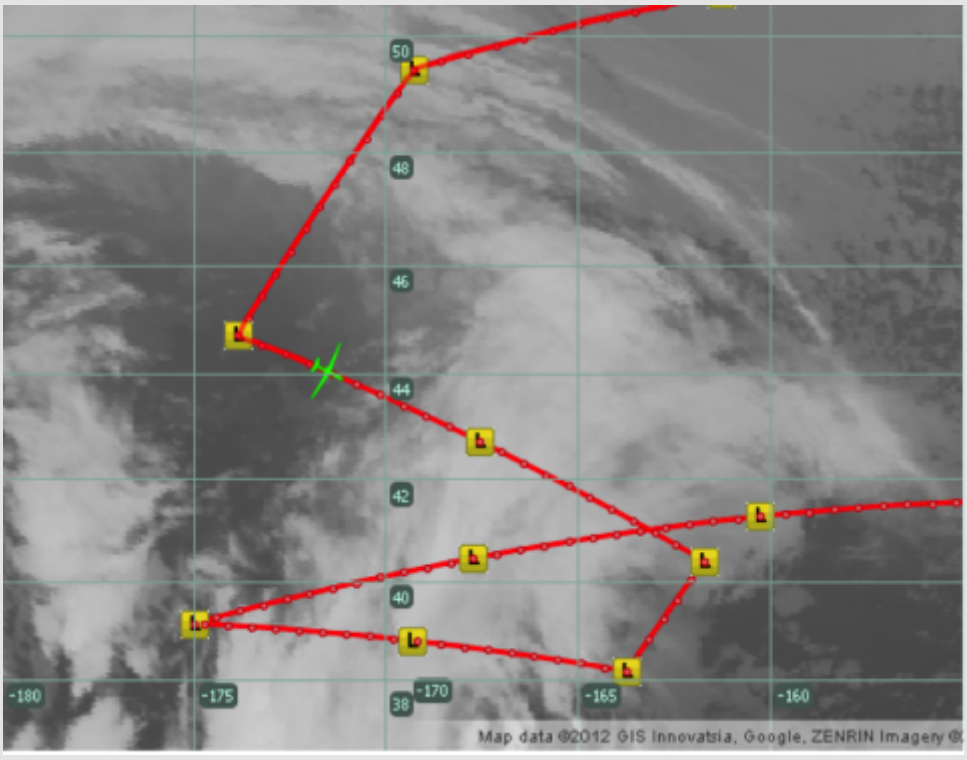
GOES IR from 0830 UTC showing a line of colder tops has developed in the center of the pattern.



0907 UTC image showing IR, track and aircraft nearing W02 (IR time unknown). Note colder clouds top in center of pattern near 170W/40N.

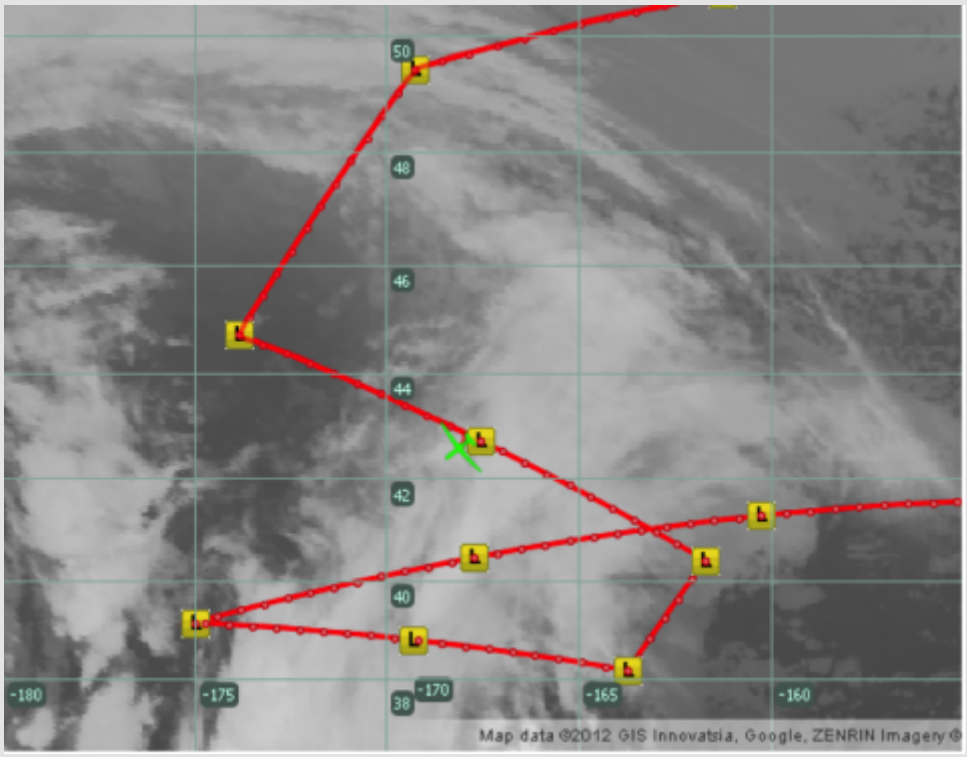
0910: Chris informed us that the pilots are still concerned about remaining fuel for the flight and expressed desire to modify the plan further. They haven?t climbed to expected altitude and are burning more fuel. They?ll recalculate on the next leg and let us know if further changes are required. We informed them that we?d rather not chop the lawnmower on the southern east-west leg since this leg will potentially have decent precipitation to sample. Instead we can eliminate the bow-tie over the final buoy and simply overfly, or at worst, take a more direct route back. But may still require modification to the lawnmower.

0923: Passing W02. IR indicates mostly clear skies near this waypoint. Any precipitation occurring on this northwest to southeast leg would seem to be fairly well centered on the leg.

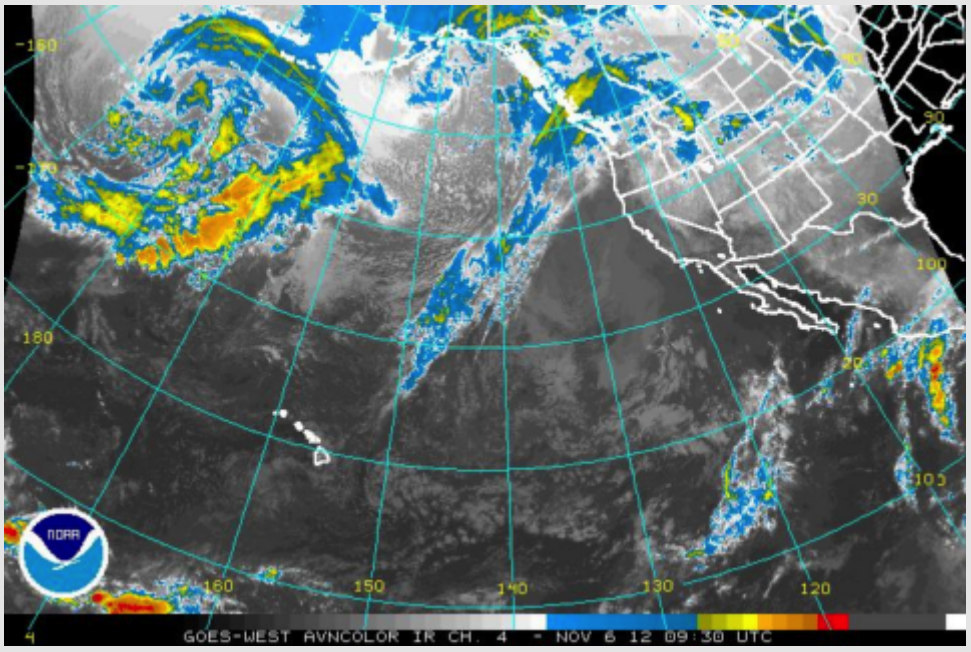


0942 UTC image showing IR, track and aircraft heading to N04 (IR time unknown).

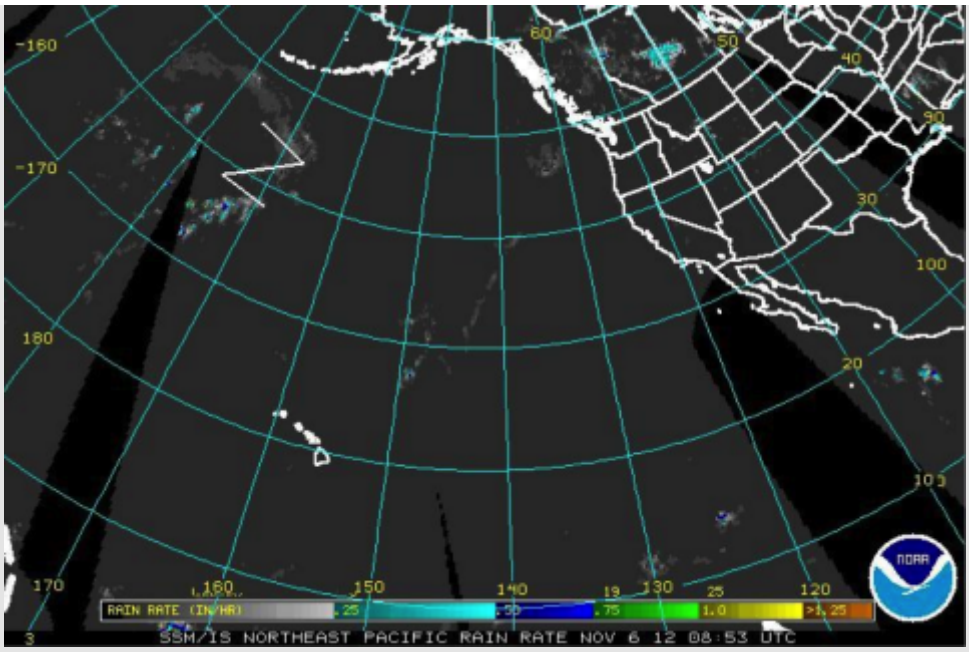
0950: Pilots recalculated fuel remaining and request that the lawnmower be adjusted. Decided to go from N04 (center point of first NW-SE leg) direct to W06 (which is the southwestern most point) then proceed eastward along southern leg to original N05, then proceed along transit to buoy K46006 ? although this transit may require further adjustment. Emphasized the importance of keeping at least some of the southern-most east-west leg since this is where we have the best chance at seeing decent precipitation. This adjustment basically removes much of the sampling on the eastern portion of the lawnmower; however this is considered a better sacrifice considering that the highest probability for high winds and precipitation are on the western to central portion of the pattern. We?ll still sample the eastern side on transit out of the pattern.



1015 UTC image showing IR, track and aircraft nearing W02 (IR time unknown).

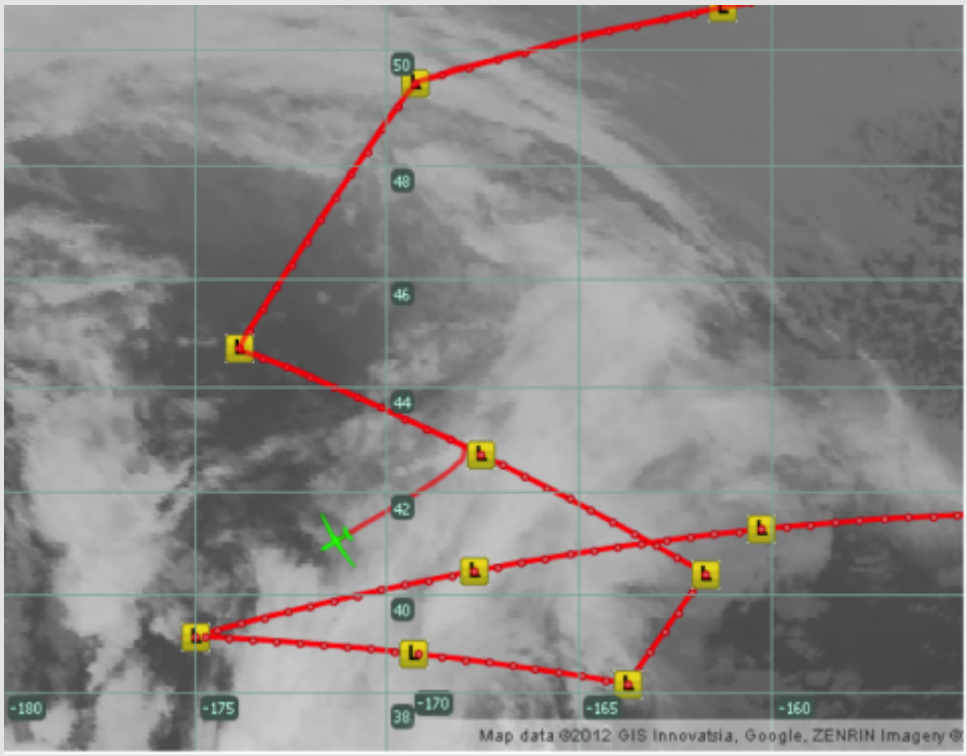


GOES IR from 0930Z

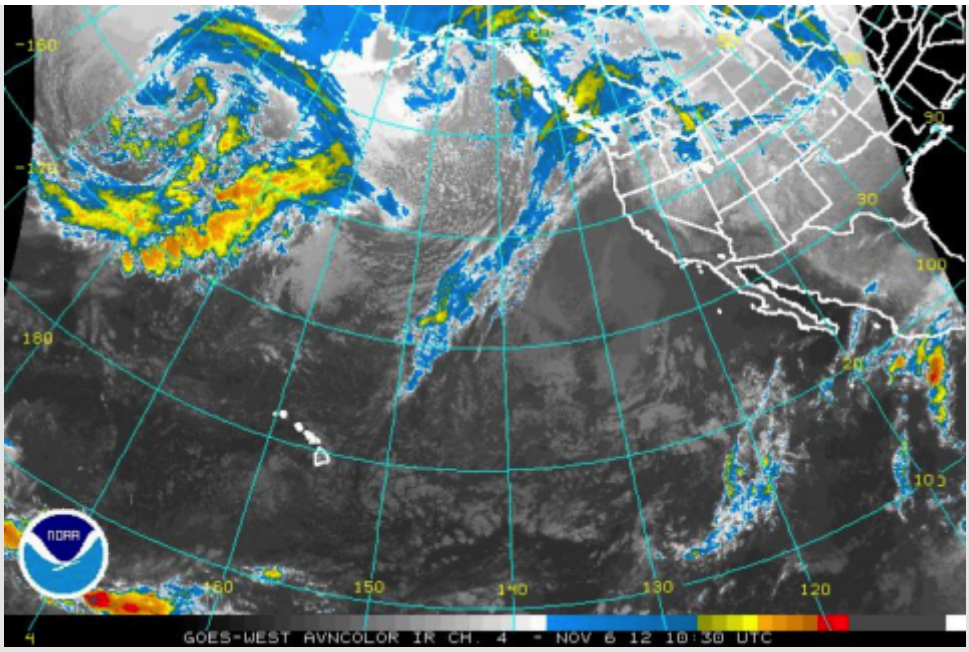


SSM/IS rain rate at 0853 UTC. The new pattern as about of about 1000 UTC is shown in white. Best precipitation remains just south of the pattern. IR has continued to indicate a general northward movement of clouds associated with that precipitation over the past hour.

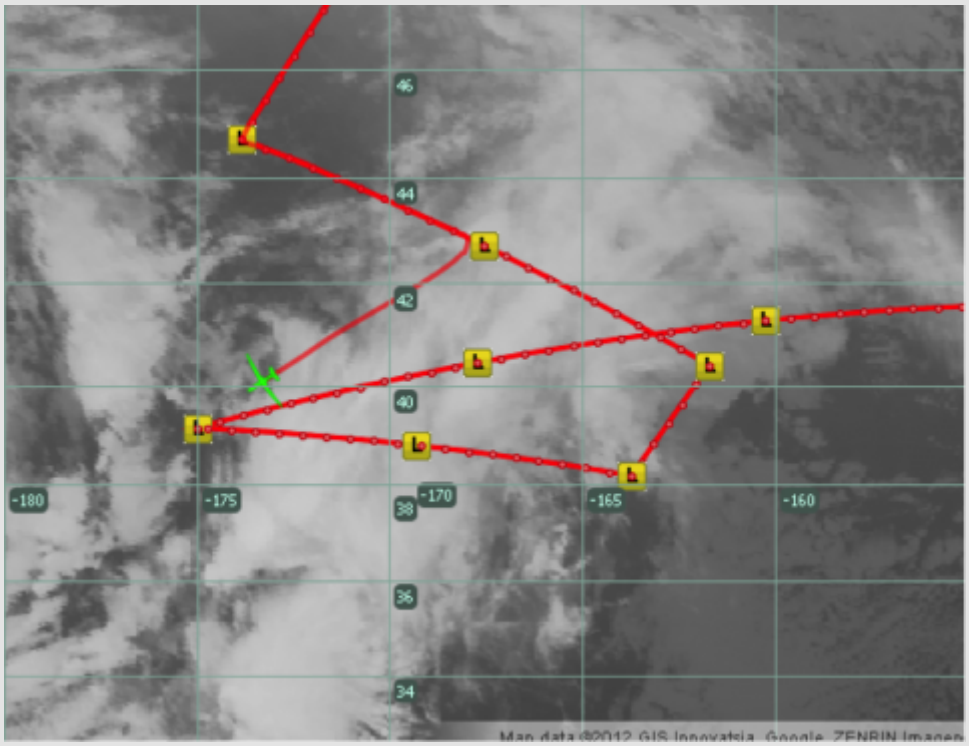
1040: Although IR does not indicate a lot of higher topped clouds along the current route (NE-SW leg from N04 to W06), there could still be some remnant light precipitation from the developing region to the south. A line of colder cloud tops seen earlier remains persistent to the east of the current location; however, this area has not been tracked back to the southwest where the precipitation has been developing and may not be associated with precipitation. The best possibility remains to head to the southwestern portion of the pattern.



1045 UTC image showing IR, track and aircraft nearing W06 (IR time unknown).



GOES IR from 1030Z; valid while proceeding on NW-SE leg towards W06.

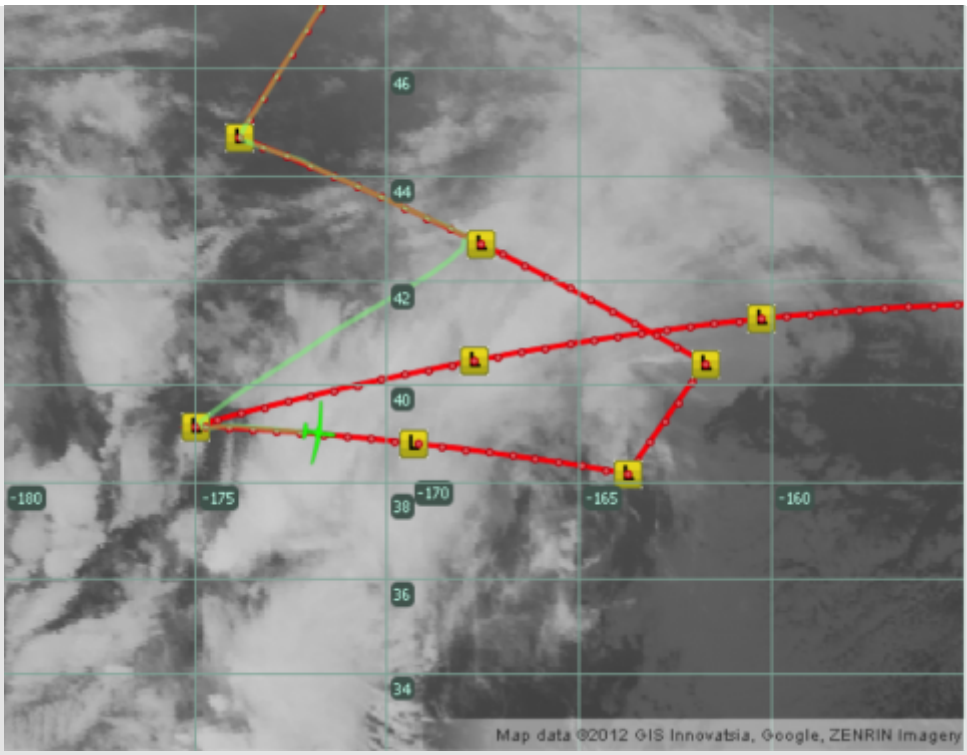


1105 UTC image showing IR, track and aircraft nearing W06 (IR time unknown). Precipitation developing just south of pattern and moving into southern east-west leg.

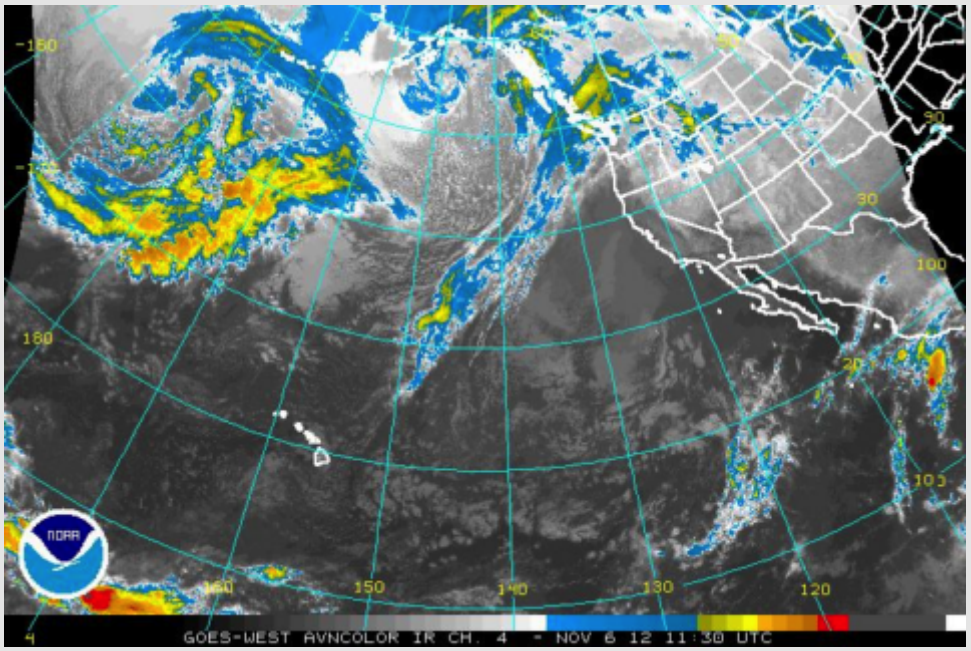
1120: Turning at W06. This waypoint, according to the IR, is in somewhat clear skies so we won?t be trying to sample precipitation while turning ? this would have been an issue had we had to move W06 farther east.

1130: About to enter a region (from west to east) that should be precipitating (best guess given the IR loop). Have seen development just south of this track over the past couple of hours ? with continued northward movement into the pattern. We?ll be heading east/northeast towards original W03.

1145: Now over the best looking region we?ve seen over the past few hours on this leg. Corresponding IR imagery below.

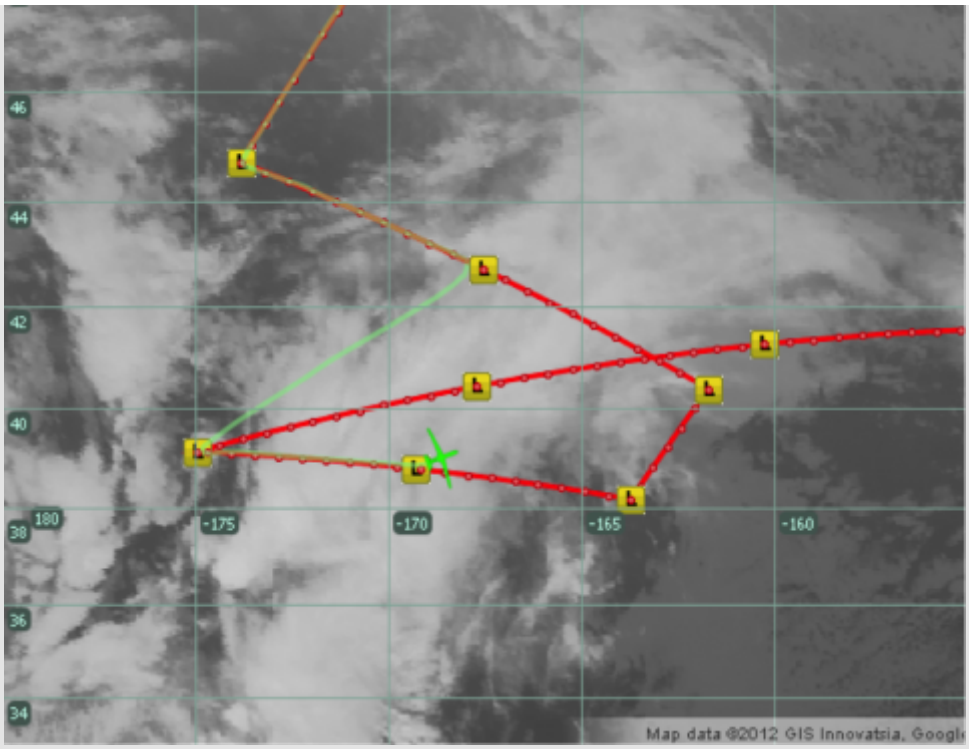


1149 UTC image showing IR, track and aircraft after passing W06 and over cold cloud tops (IR time unknown)

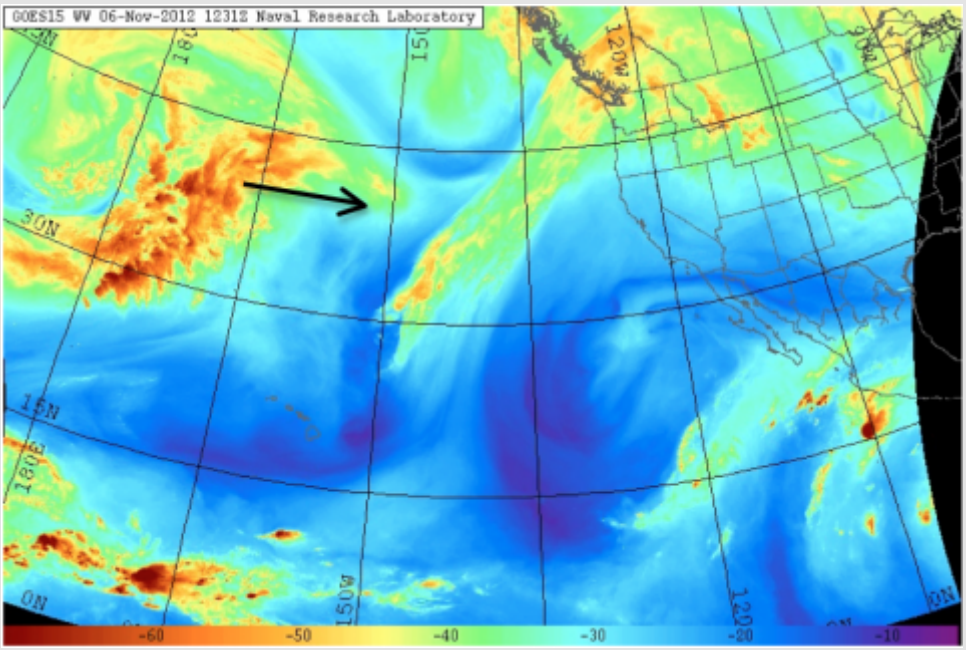


GOES IR from 1130Z; valid while proceeding on West-East southern-most leg towards N05.

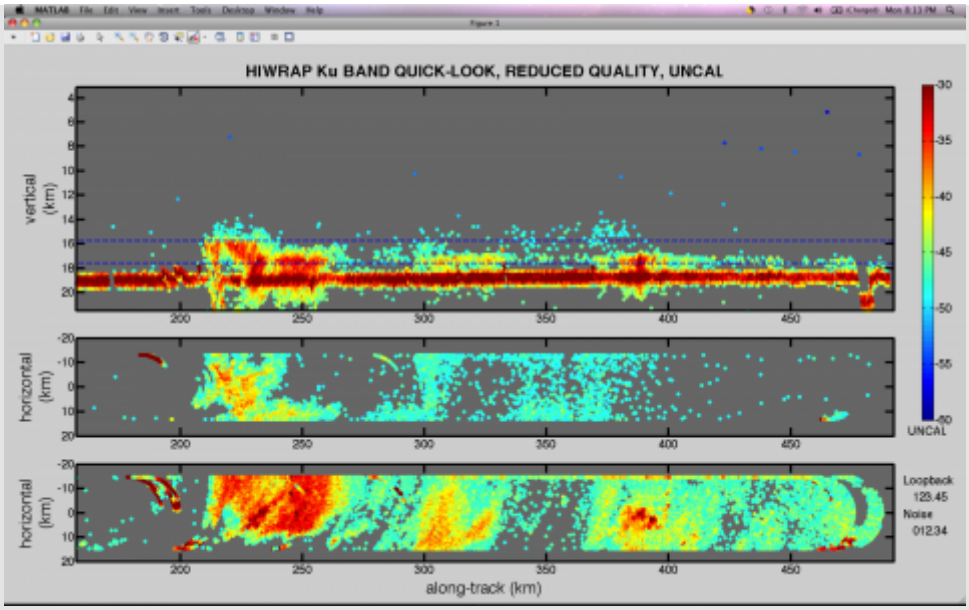
1215: Have turned toward heading 070 deg. Still flying over cold cloud tops, so some precipitation may still be present.

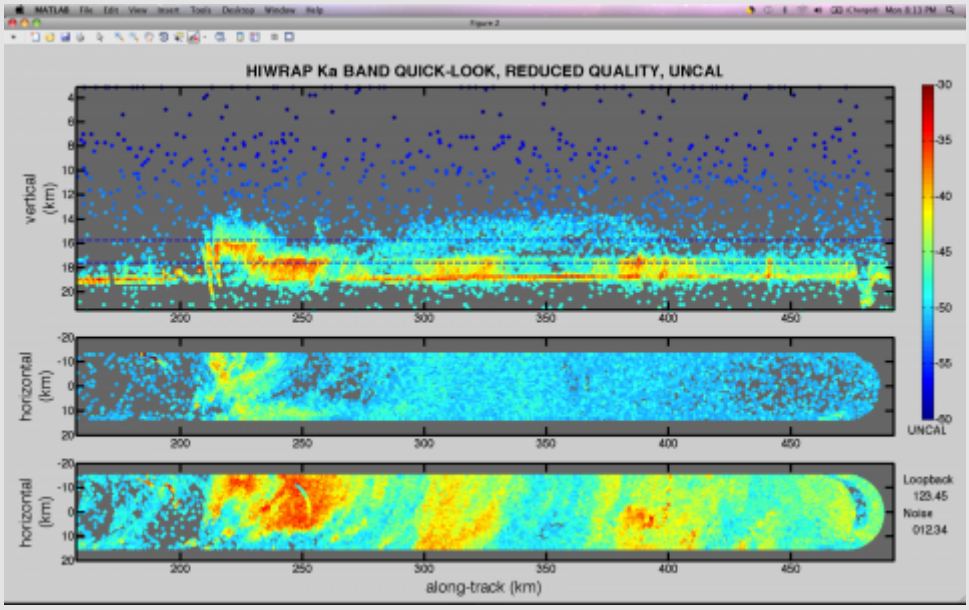


1215 UTC image showing IR, track and aircraft after passing N05 and over cold cloud tops (IR time unknown)

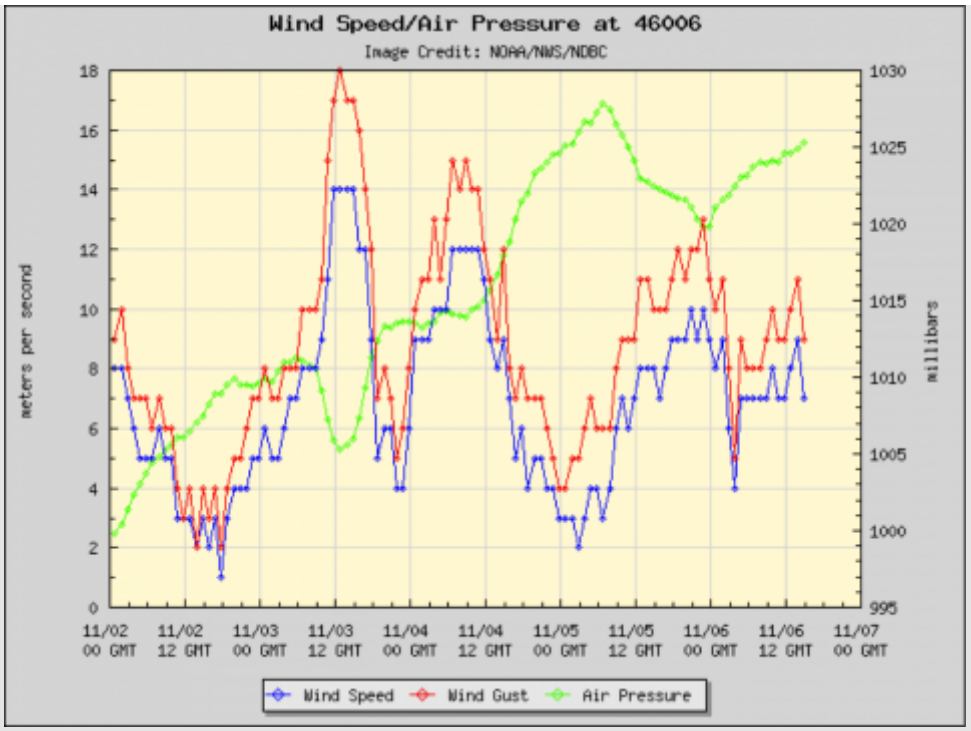


1231 UTC GOES water vapor channel color enhanced by the Naval Research Laboratory. Current trajectory of AV-1 (rough) shown by the black arrow.



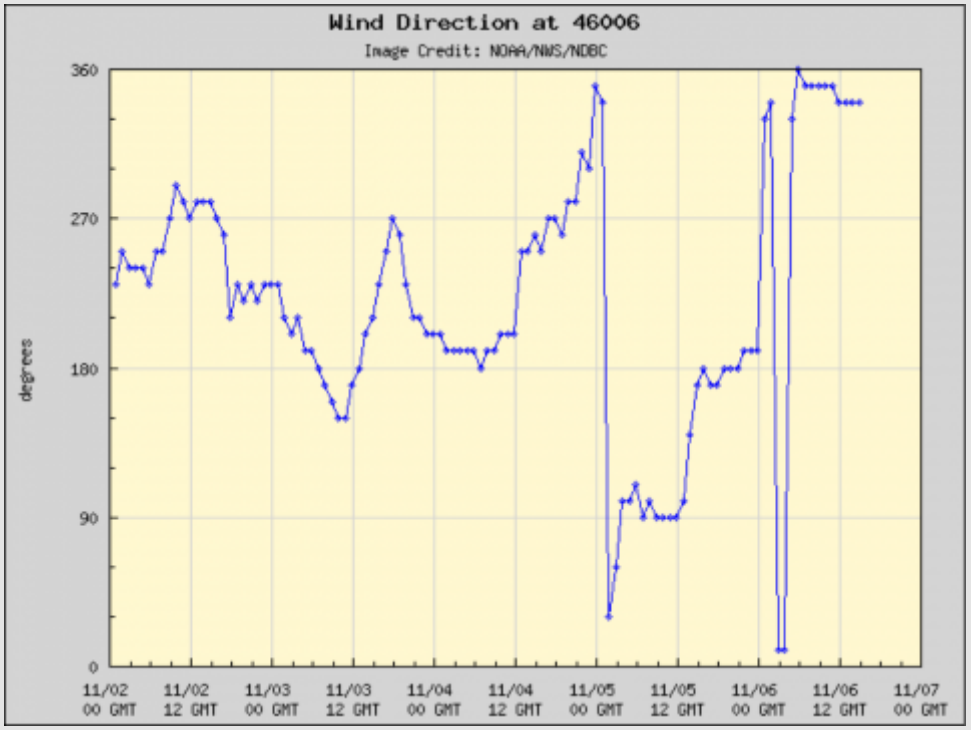


Ku and Ka band real-time, un-calibrated returns from HIWRAP near buoy K46036. This was the second buoy in the flight track (near beginning of flight). There is mostly stratiform precipitation associated with a frontal system although around 225 km along track there is convection (looks like some attenuation present as well). The top image in each panel shows a vertical slice along nadir (thick, horizontal high power return is the ocean surface). The next two images in each panel show horizontal cross-sections at the locations of the dashed blue lines in the nadir image. Note the y-axis is distance from the radar, not true altitude. Winds from the buoy will be used to validate ocean surface wind retrievals from HIWRAP.

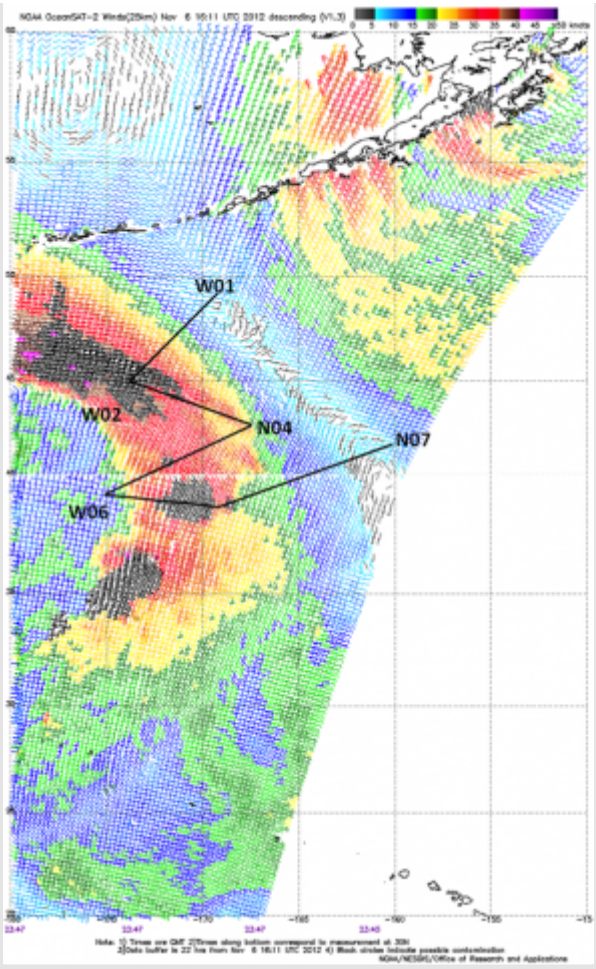


Data from buoy 46006 at ~ 1550 UTC when AV-1 flew over the buoy. Winds and gusts are fairly weak at ~ 10 m/s or less. AV-1 did a bow-tie pattern around the buoy.

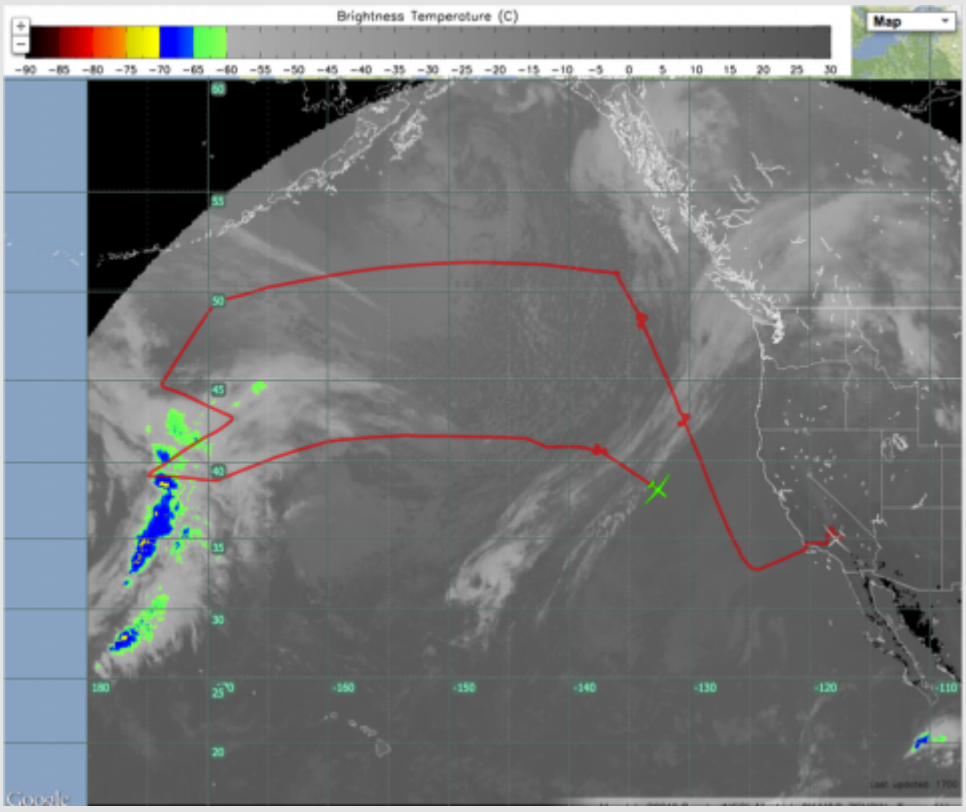
Note: Ku-communications coverage is spotty here, but we expect to get a decent signal once the aircraft finishes with the buoy pattern and the attitude is stabilized.



Same as above only for wind direction.



The image above shows the OSCAT winds at ~00UTC 6 Nov. The flight segment shown started around 08 UTC and ended about 12 UTC 6 November. Therefore, it appears that AV-1 overflew some of the stronger winds associated with this system.



GOES IR image at ~1730 UTC. The coldest tops are located primarily southward of the flight region. At the time of the image, the GH was at an altitude of 61.7 kft.

Ku was lost some time after completing the maneuver at the last buoy and they were unable to bring it back up prior to landing.

Max altitude just prior to reach CA coast was 62.8 kft.

Landing time was 2150 UTC.

Submitted by:
Erin Czech on 11/28/12

Flight Reports began being entered into this system as of 2012 flights. If there were flights flown under an earlier log number the flight reports are not available online.

12H002 Flight Reports

Date	Flt #	Purpose of Flight	Duration	Running Total	Hours Remaining
08/28/12	872-0094	Check	5.5	5.5	321.5
08/30/12	872-0095	Maintenance	0.7	6.2	320.8
09/06/12 - 09/07/12	872-0096	Science	19.3	25.5	301.5
09/11/12 - 09/12/12	872-0097	Science	25.7	51.2	275.8
09/14/12 - 09/15/12	872-0098	Science	22.4	73.6	253.4
09/19/12 - 09/20/12	872-0099	Science	24.8	98.4	228.6
09/22/12 - 09/23/12	872-0100	Science	25.1	123.5	203.5
09/26/12 - 09/27/12	872-0101	Science	25.4	148.9	178.1